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SIMPLEX MOORING UNDERWATER INSPECTION REPORT(U) NAVAL  
FACILITIES ENGINEERING COMMAND WASHINGTON DC CHESAPEAKE  
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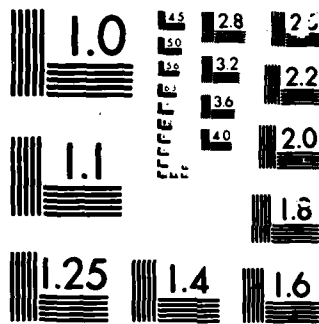
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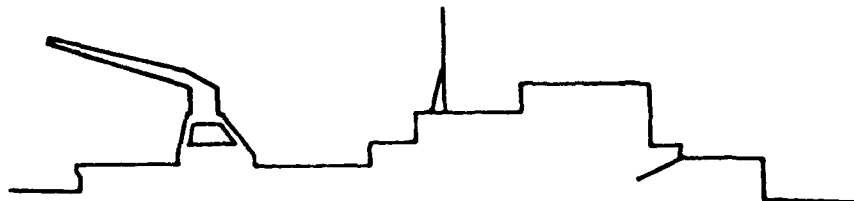
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SIMPLEX MOORING  
UNDERWATER INSPECTION REPORT

JULY 1983

FPO 1 83(30)



# Ocean Engineering

CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
WASHINGTON NAVY YARD  
WASHINGTON, DC 20374

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UNDERWATER INSPECTION REPORT**

**JULY 1983**

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This inspection report contains an evaluation of the Navy-owned mooring located at the Simplex Wire and Cable Company plant near Portsmouth, NH. This information is based on an underwater inspection of the mooring by CHESNAVFACENGCOM and divers from Underwater Construction Team One during the (Con't)

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BLOCK 19 (Con't)

period 4-8 April 1983.

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# ABSTRACT

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*Keywords: Mooring Systems, Single Mooring Underwater Inspections* ↗

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## **1.0 INTRODUCTION**

### **1.1 Background**

CHESNAVFACENGCOM and Underwater Construction Team One (UCT ONE) were tasked by NAVELEXSYSCOM to inspect a Navy-installed mooring in the Piscataqua River at the Simplex Wire and Cable Company plant near Portsmouth, NH. CHESNAVFACENGCOM designated an Engineer in Charge (EIC) to provide inspection planning and on-site technical direction for the inspection. The underwater portion of the inspection was carried out by a detachment of divers from Underwater Construction Team One from Little Creek, Virginia. Figure 1 shows the general location of the mooring, and Figure 2 the arrangement of the mooring and shore leg.

### **1.2 Mooring Historical Data**

The Simplex Mooring was designed and installed by CHESNAVFACENGCOM in response to tasking from the Naval Electronic Systems Command. The U. S. Coast Guard First District provided an installation vessel and crew. The installation was performed in May and June 1978.

The mooring is a modified Class B riser-type moor consisting of three anchor legs and an auxiliary leg. A separate shore leg leads from a hurricane block installed on shore. The mooring is used only for a liberty-type hull. The bow of the ship is tied to the mooring buoy and the shore leg, and the stern to an existing dolphin. Each of the anchor legs has an 8200# concrete sinker and a 25,000# anchor. The auxiliary leg has a 10,000# anchor. The riser and ground legs are made up of 2½-inch chain, the auxiliary leg is 2-inch chain, and the shore leg is 2½-inch chain.

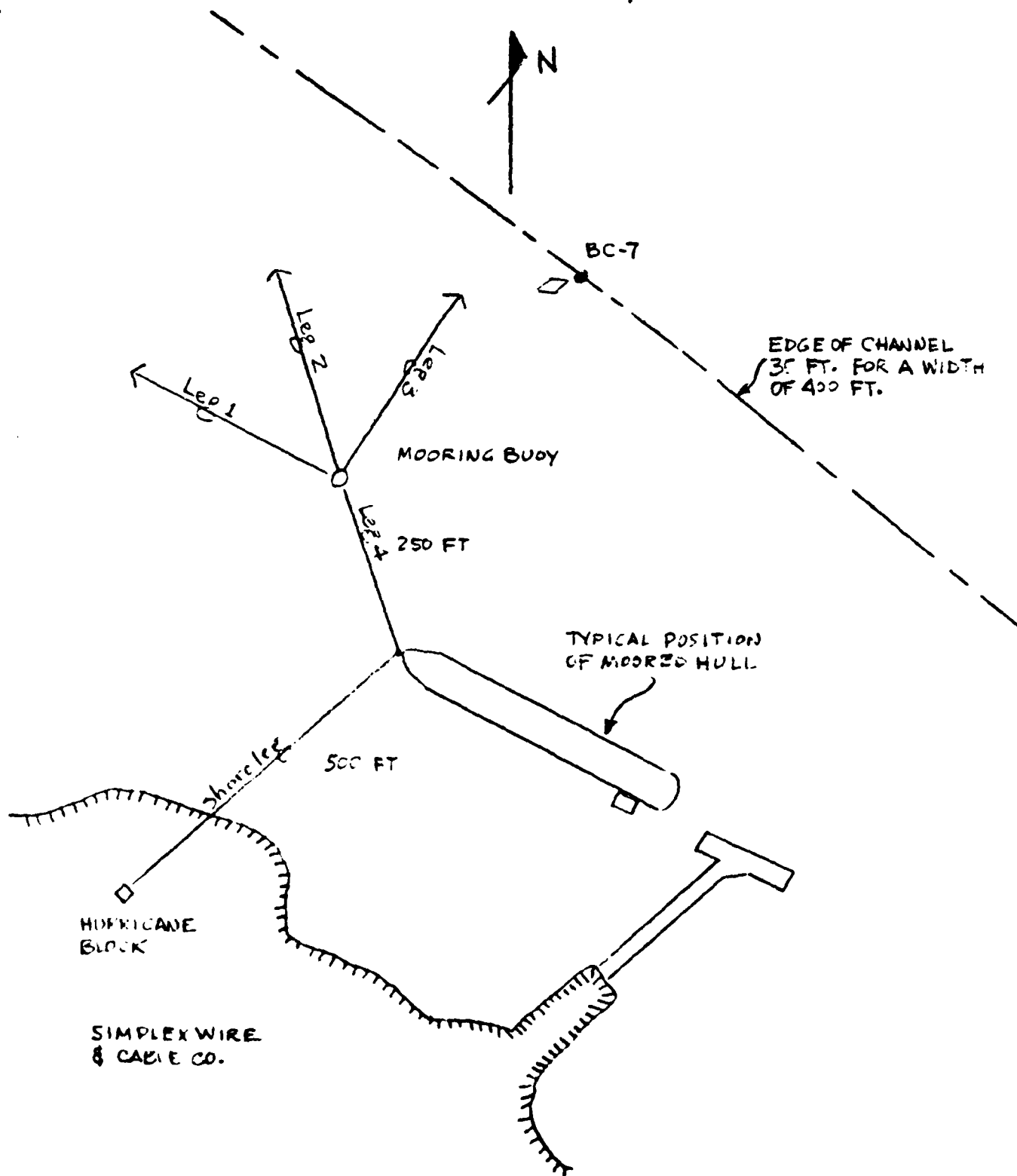
The mooring was inspected by CHESNAVFACENGCOM and UCT ONE in November 1981 and found to be in satisfactory condition. It was noted at that time that the marker buoy and riser wire at the outboard end of the shore leg were missing. It was also noted that the fluke of the anchors on legs 2 and 3 had remained in an upright position since installation.

## **2.0 INSPECTION PROCEDURES**

### **2.1 Inspection Objectives**

The purpose of the mooring inspection is to determine the general physical condition of the buoy and chain assemblies. Divers inspect only a portion of the submerged buoy hull and chain assemblies in order to compile a general description of the condition of the mooring. The existence of fairly consistent measurements





MOORING LAYOUT

Figure 2

during an inspection provides a good indication of the mooring's overall condition. However, periodic underwater inspections are intended as an expedient and relatively inexpensive supplement to accurate maintenance records. As such, they cannot fully substitute for a complete inspection involving recovery of the mooring and the measurement and evaluation of each component.

Chain wire diameter is the most important parameter used to evaluate the condition of mooring chain assemblies. After areas of the chain are cleaned to bare metal, measurements are made to determine deterioration due to corrosion and wear. "Single-link" measurements, of the wire diameter at the side of a link detect any decrease in size due to corrosion. "Double-link" measurements, made where two links connect under tension, determine the combined effects of corrosion and wear. Chain links and other components which measure more than 90 percent of original diameter are considered to be in "good" condition; a measurement between 80 percent and 90 percent is considered "fair" and is cause for the mooring to be downgraded in classification; any measurement less than 80 percent is considered "poor" and is cause for the mooring to be declared unsatisfactory for fleet use. Standard underwater inspection procedures do not call for the inspection of any parts of the mooring which have become buried. Ground legs and risers are examined only to the point where they become buried; no attempts are made to locate and inspect sinkers and anchors which are not readily visible.

## 2.2 Conduct of Inspection

### 2.2.1 Buoy

The buoy was examined to determine its general condition. Physical damage was noted and the paint and general condition of the surface were examined. The buoy top chain jewelry was inspected and measured with calipers if their condition indicated significant wear. The divers inspected the buoy below the waterline. Any marine growth was noted and the condition of the paint was noted. The bottom chain jewelry connecting the buoy to the riser was visually inspected for corrosion or wear.

### 2.2.2 Riser

To determine chain wear, the riser chain was inspected by taking three adjacent double-link measurements at the top of the chain, at the center of the riser, and near the ground ring.

### 2.2.3 Ground Legs

To determine chain wear, three adjacent double-link measurements were made at various points along each leg until the chain was buried in the river bottom. The hardware connecting the ground leg to the ground ring was inspected, and the connections to the concrete clumps were examined.

A pop float was attached to the anchors on legs 2 and 3, and to the points on legs 1 and 4 where they entered the bottom. These were located by triangulation from survey points on the shore.

#### 2.2.4 Ground Ring

The ground ring was examined for general and localized wear. The water depth at the ground ring was recorded by the divers.

#### 2.2.5 Anchors

The two anchors (legs 2 and 3) which were visible were inspected by the divers.

### 3.0 MOORING INSPECTION RESULTS

#### 3.1 Buoy

This is a 12-foot diameter x 6-foot high hawsepole-type buoy. It exhibits light to moderate rusting with essentially no marine growth. The buoy's top and bottom connecting hardware and the rubbing casting are in good condition. Approximately one shot of 2½-inch chain has been left attached to the top of the buoy. The chain will be removed at a later date by Simplex personnel.

#### 3.2 Riser

The riser consists of 2½-inch chain and is 35 feet long. A swivel is located at the approximate mid-point of the riser. The riser chain wire diameter is greater than 90 percent of the original value and the swivel and connecting hardware are in good condition. The ground ring was located at a depth of 35 feet and was found to be in good condition.

#### 3.3 Ground Legs

The three main ground legs are also 2½-inch chain and are greater than 90 percent of original wire diameter. Each of the main legs has an 8200# concrete sinker. The joining links, sinker shackles and hairpins of the sinkers on legs 2 and 3 are in good condition. Leg 1 enters the bottom before reaching the sinker.

The auxiliary or keeper leg consists of 2 shots of 2-inch chain with a swivel between shots, and a 10,000# anchor. This leg enters the bottom shortly before reaching the swivel. The chain is greater than 90 percent of original wire diameter.

### 3.4 Shore Leg

The shore leg consists of 455 feet of miscellaneous lengths of 2½-inch chain attached to a hurricane block on shore and laid on the bottom to a point near the mooring buoy. A riser wire and marker buoy attached near the end of the chain allow the end of the chain to be retrieved and attached to the port anchor chain of the vessel being moored. See Figure 3. As mentioned above, this assembly was missing and was replaced by the dive team. The pre-assembled marker buoy did not include a sinker shackle, so that it was necessary to fabricate one from a 3-inch anchor shackle. The Simplex welding shop performed this modification (Figure 4).

The outboard end of the shore leg was found to be some 100 feet southwest of its nominal position, but since it will be "dumped" in a random location each time the mooring is used, no attempt was made to relocate it.

A previous inspection report indicated that the shore leg appeared to be attached to the ground ring; this is not the case.

### 3.5 Geographic Location of Mooring Components

At the time of installation, the ground leg anchors were dropped at surveyed locations as measured from a baseline established on shore. However, no data has been located as to their final position after pulling on the mooring in an attempt to set the anchors.

New points were established, as shown in Figure 5 and the locations of the mooring buoy and the anchors on legs 2 and 3 were determined with respect to these. The locations thus determined agree to within about 30 feet with those shown in Figure 2. It is concluded that no significant movement of the mooring has occurred.

### 3.6 Anchors

Only two of the four anchors, those on legs 2 and 3, could be located. These anchors and their connecting hardware are in good condition. As reported by the previous inspection, the flukes on both anchors are in an upright position.

#### **4.0 MOORING INSPECTION COMMENTS AND RECOMMENDATIONS**

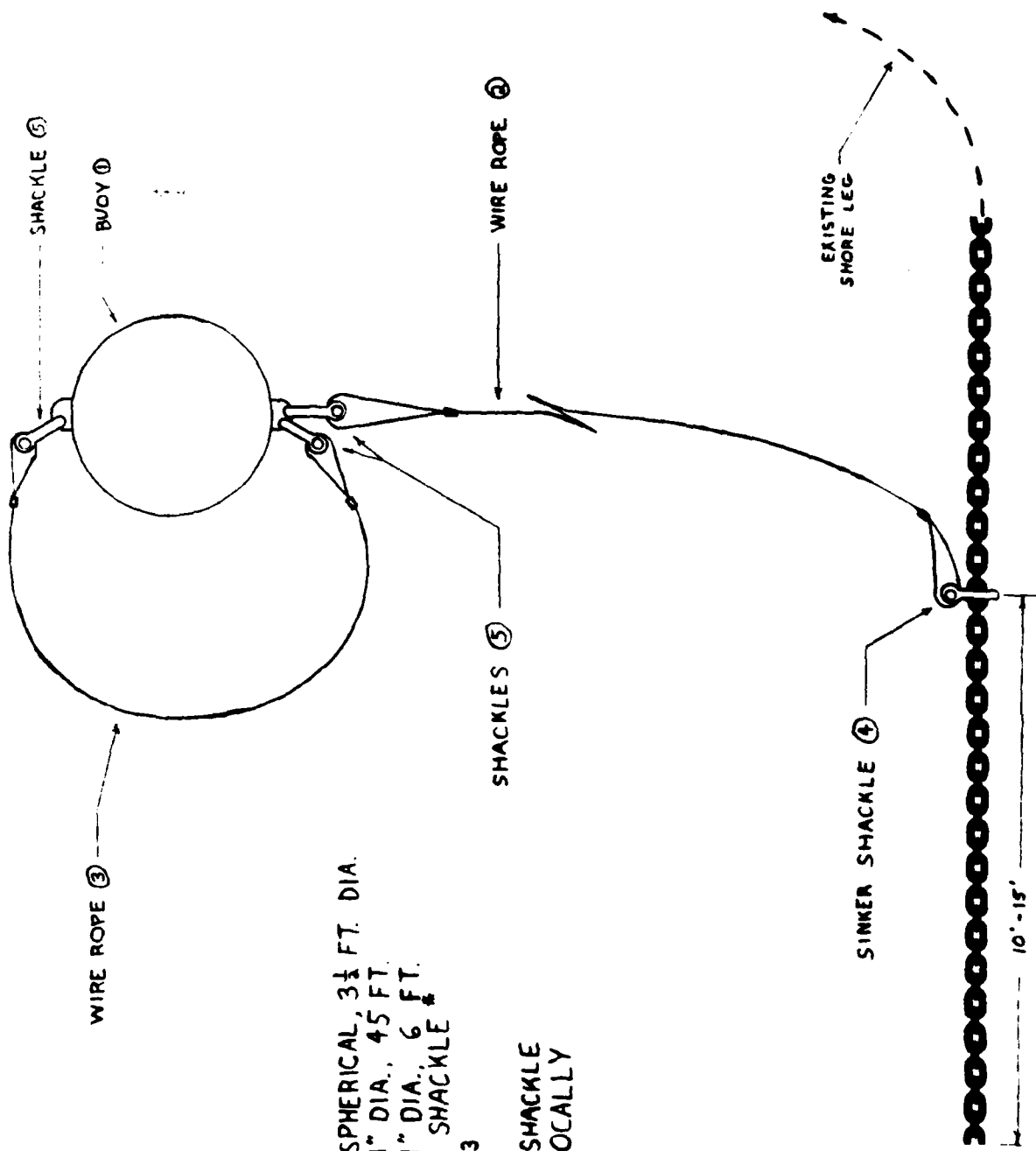
**As a result of the data gathered during the inspection, the following comments and recommendations are pertinent:**

- o The condition of the buoy, chains and chain hardware indicate no serious material deficiencies. No corrective action is currently required or recommended.**

- o Users of the mooring should be encouraged to retain the marker and riser wire for the shore leg and to replace it on the shore leg before casting off the mooring.**



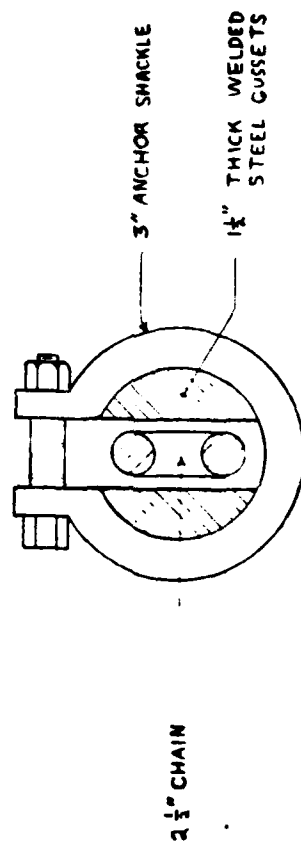
# BILL OF MATERIALS FOR MARKER BUOY



- 1 BUOY, STEEL, SPHERICAL, 3 1/2 FT. DIA.
- 2 WIRE ROPE, 1" DIA., 45 FT.
- 3 WIRE ROPE, 1" DIA., 6 FT.
- 4 2 1/2" SINKER SHACKLE
- 5 1" SHACKLE, 3
- \* 3" ANCHOR SHACKLE  
MODIFIED LOCALLY

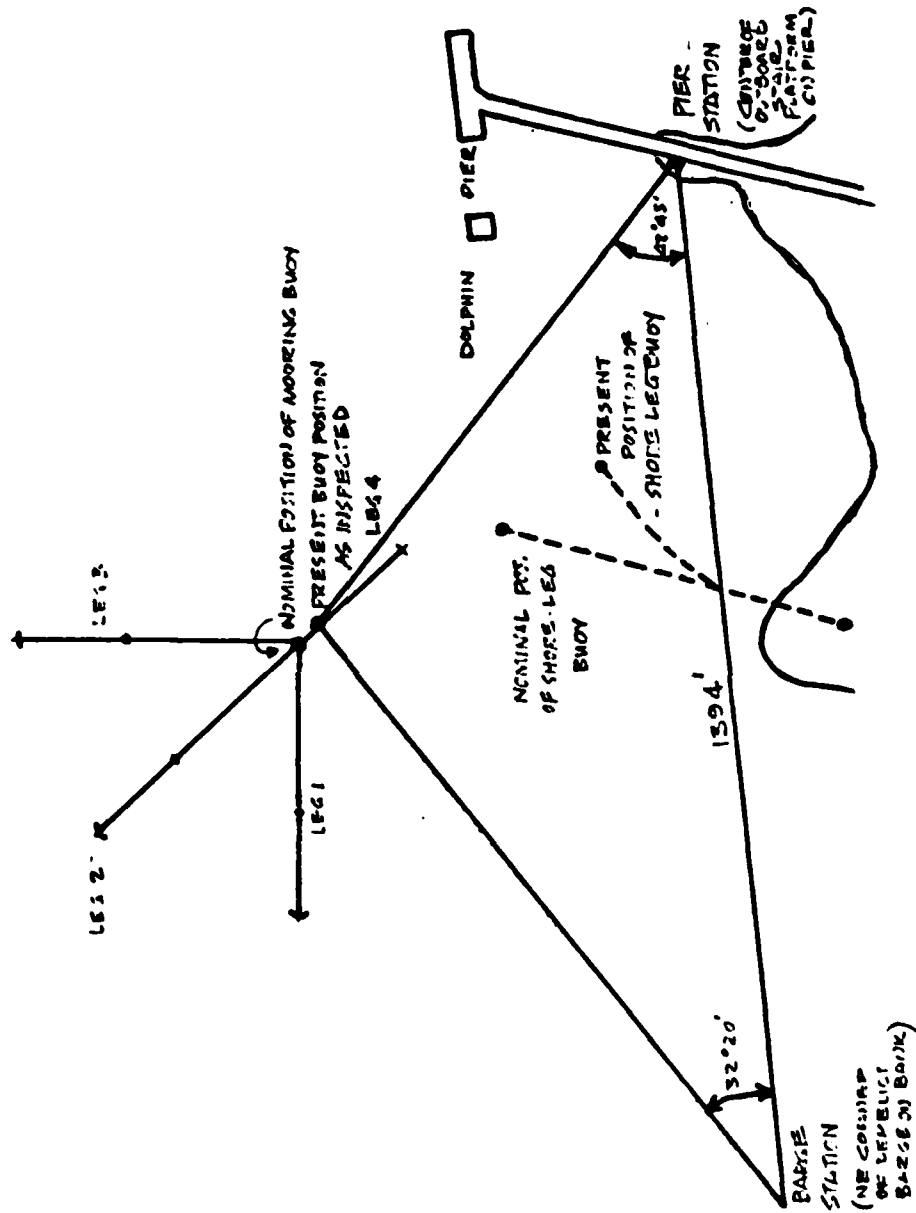
SHORE LEG MARKER BUOY ASSEMBLY

Figure 3



MODIFIED 3" SHACKLE

Figure 4



GEOGRAPHIC LOCATION OF MOORING

Figure 5

## **APPENDIX A**

### **A-1 Log of Events**

- 5 April 1983**
  - o UCT ONE detachment arrived.**
  - o Logistic and administrative arrangements made: provided storage at Simplex plant for equipment and vehicles, located boat-launching ramp, visual survey of work site.**
- 6 April 1983**
  - o Checked emergency medical and decompression chamber facilities at PNSY.**
  - o First dive at p.m. slack tide.**
  - o Checked shore leg of mooring and temporarily marked position for installation of marker buoy.**
- 7 April 1983**
  - o Simplex modified available shackle for connection to end of shore leg.**
  - o Divers installed marker buoy and riser wire on end of shore leg.**
- 8 April 1983**
  - o Inspected mooring riser and ground legs.**
  - o Attached pop floats to 2 of 4 anchors (other two are buried in bottom) and surveyed positions, using shore reference points.**
  - o Departed area.**

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